IN THE UNITED STATES PATENT & TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

SERIAL NO.:	**09/604,218**
FILED:	**JUNE 27, 2000**
FOR:	**FUNCTIONALLY GRADED FRICTION MATERIAL**
APPLICANT:	**TULIN K. HIDAYETOGLU**
ART UNIT:	**1762**
EXAMINER:	**E. TSOY**
CONFIRMATION NO.:	**4131**

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

TRANSMITTAL OF APPEAL BRIEF
UNDER 37 CFR 1.17(c)

Transmitted herewith is the Brief **(in triplicate)** for Appellant in the above-identified application.

Please charge the **$330.00** fee for filing the Brief to **Deposit Account No. 05-0275**. A duplicate copy of this letter is enclosed.

Respectfully submitted,

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CERTIFICATE OF MAILING UNDER 37 CFR 1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on November 19, 2003.

Melissa Henthorn

IN THE UNITED STATES PATENT & TRADEMARK OFFICE
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BRIEF OF APPELLANT UNDER 37 CFR 1.192

May It Please Your Honors:

The final rejection in the above-identified patent application was mailed June 30, 2003, rejecting all of the claims. The Appellant filed a Notice of Appeal on September 23, 2003.

The following is the Appellant's Appeal Brief as required under 37 C.F.R. §1.192(a).

REAL PARTY IN INTEREST

The assignee of the entire interest, Eaton Corporation, 1111 Superior Avenue, Cleveland, Ohio 44114, is the real party in interest; and, the inventor was employed by the assignee. The Assignment for this patent application was recorded on June 27, 2000, in Reel 010933, Frame 0655, in the United States Patent and Trademark Office.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

CERTIFICATE OF MAILING UNDER 37 CFR 1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on November 17, 2003.

Melissa Henthorn

STATUS OF THE CLAIMS

Claims 1-8, 11-15, and 20-23 have been rejected. Claims 9 and 10 were cancelled without prejudice. Claims 16-19 were withdrawn from consideration pursuant to a restriction requirement. No claims have been allowed. The Appellant is appealing the Examiner's final rejection of claims 1-8, 11-15, and 20-23. Appendix A contains a copy of all of the appealed claims.

STATUS OF AMENDMENTS

The Appellant has not filed any amendments subsequent to the final rejection.

SUMMARY OF THE INVENTION

The present invention is directed to a clutch facing material with improved wear resistance and thermal conductivity, see page 1, lines 12-17, of the subject patent application.

Referring to Figure 2, and page 4, line 22, through page 6, line 1, of the subject patent application, the clutch facing material according to claim 1 of the present invention comprises a functionally graded material that includes a composite material 18 having heat and wear resistant fibers 10 impregnated with a resin 16. A plurality of heat conducting elements 12 are situated within the functionally graded material in a selected orientation and spatial distribution with a varying concentration. Refer particularly to page 4, lines 22-24, of the subject patent application where the term "functionally graded material" is defined as "... a composite material with a microstructure tailored in terms of spatial distribution and concentration of different material phases or elements.". The term "heat conducting element" is defined on page 11, lines 4-14, of the subject patent application. The functionally graded material is constructed for engagement with a cooperating movable member and includes a first friction surface 20 constructed for engagement with the movable member and a second non-engaging surface 22. The varying concentration of the heat conducting elements 12, which decrease in concentration from the first friction surface 20 to the

second non-engaging surface 22, transfer heat away from the first surface 20 to the second surface 22 as described in detail on page 12, lines 1-10, of the subject patent application.

Claim 2 depends upon claim 1, and further limits the heat conducting elements in a Markush expression to filaments, threads, wires, powders and particulate disposed in a predetermined arrangement, see page 13, line 23, through page 17, line 15, of the subject patent application.

Claim 3 depends upon claim 1, and further limits the heat conducting elements 12 to a position substantially normal to the first friction surface 20.

Claim 4 also depends upon claim 1, and limits the heat and wear resistant fibers 10 to aramid fibers, refer to page 11, lines 15-29, of the subject patent application.

Claim 5 depends upon claim 4, and further limits the aramid fibers to p-aramid fibers.

Claim 6 depends upon claim 2, and limits the heat conducting elements 12 in a Markush expression to the recited compositions.

Claim 7 depends upon claim 1, and limits the fibers 10 in a Markush expression to specific type fibers.

Claim 8 depends upon claim 1, and provides that the heat conducting elements have a greater density on the first friction surface 20 than on the second non-engaging surface 22.

Claim 11 is in independent form, and is directed to a composite clutch facing material having opposed surfaces 20, 22 with one surface 20 engaging a movable, engageable part. Claim 11 recites the improvement as comprising heat conducting elements 12 disposed in the composite clutch facing material in a selected arrangement and a varying concentration for transferring heat away from the engaging surface 20 to a non-engaging surface 22. The varying concentration of the heat conducting elements 12 decrease in concentration from the first surface 20 to the second non-engaging surface 22.

Claim 12 depends upon claim 11, and limits the heat conducting elements 12 to a plurality of metal components disposed within the friction material.

Claim 13 depends upon claim 12, and limits the plurality of metal components to filaments, threads, and wires.

Claim 14 depends upon claim 13, and limits the metal components specifically to copper and copper alloy components.

Claim 15 depends upon claim 12, and provides that the metal components are oriented substantially perpendicular to the engaging surface 20.

Claim 20 depends upon claim 11, and provides that the heat conducting elements 12 have a greater density on the engaging surface 20 than on the non-engaging surface 22.

Claim 21 depends upon claim 8, and provides that the density of the heat conducting elements 12 on the first friction surface 20 ranges between about 22.5 to about 42.5 percent on a weight percent basis. Refer to page 12, lines 15-29, of the subject patent application.

Claim 22 depends upon claim 4, and limits the heat conducting elements to copper threads that are woven with the aramid fibers, see page 12, lines 1-9, of the subject patent application.

Claim 23 depends upon claim 8, and provides that the varying concentration of the heat conducting elements 12 decreases in concentration over a depth of about 0.05 inches to about 0.10 inches, see page 12, lines 28-29, of the subject patent application.

ISSUES

I. Whether claim 5 is unpatentable under 35 U.S.C. § 112, second paragraph, as being indefinite?

II. Whether claims 1-8, 11, 12, 20, 21, and 23 are unpatentable under 35 U.S.C. § 103 (a) as being obvious over the Booher patent (U.S. Patent No. 5,156,787) in view of the Miyamoto et al. patent (U.S. Patent No. 6,001,440)?

III. Whether claims 13-15 and 22 are unpatentable under 35 U.S.C. § 103(a) as being obvious over the Booher patent (U.S. Patent No. 5,156,787) in view of the Miyamoto et al. patent (U.S. Patent No. 6,001,440), and further in view of the Nakamoto et al. patent (U.S. Patent No. 6,098,612)?

GROUPING OF THE CLAIMS

Regarding Issue I, claim 5 stands alone.

Regarding Issues II and III, the Appellant respectfully submits that all of the claims are separately patentable from each other. The Appellant's reasons for separate patentability are given in the appropriate Argument section. Accordingly, the Appellant believes that these claims should not stand or fall together.

ARGUMENT

I. REJECTION UNDER 35 U.S.C §112, SECOND PARAGRAPH

The Examiner rejected claim 5 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention.

The Appellant contends that this rejection is erroneous in that the Examiner has not explained why claim 5 is indefinite. The Appellant surmises the rejection is based on the language "friction material" in the preamble rather than "clutch facing material". As fully explained in the subject application, clutch facing material is a friction material. Since claim 5 depends upon claim 4, it contains all of the limitations of that claim. Claim 5 further limits the aramid fibers to p-aramid fibers as described on page 11, lines 15-18 of the subject patent application. Since claim 5 depends upon claim 4, it narrows the scope of claim 4 and accordingly is definite.

In view of the above, the Appellant respectfully submits that claim 5 is definite.

II. **REJECTION UNDER 35 U.S.C. §103(A)**

The Examiner rejected claims 1-8, 11, 12, 20, 21 and 23 under 35 U.S.C. §103(a) as being unpatentable over the Booher patent in view of the Miyamoto et al. patent. The Examiner contends that the Booher patent discloses a clutch pad that is a functionally graded material with improved wear resistance. The Examiner says that the composite material of the Booher patent has heat and wear resistance fibers including aramid fibers and evenly distributed carbon fibers oriented perpendicular to a friction surface. The Examiner then admits that the Booher patent fails to teach that the heat conducting elements are situated within the functionally graded material with a varying concentration so that the concentration of the heat conducting elements decreases from the first engaging friction surface to the second non-engaging surface for transferring heat away from the first friction surface [U.S. PTO Office Action, Paper No.15, mailed 2/27/03, paragraph 6, pages 3 and 4]. The Examiner further admits that the Booher patent does not teach that the heat conducting elements comprise a greater density on the first friction surface than on the non-engaging surface.

The Examiner then looks to the Miyamoto et al. patent for this feature. The Examiner contends that the Miyamoto et al. patent discloses that a varying concentration of heat conducting elements that decrease from the hot surface provides a heat dissipating medium for transferring heat away from the hot surface. The Examiner further notes that Miyamoto suggests use in application fields where heat accumulation may cause problems, emphasizing column 7, lines 43-47, of the Miyamoto et al. patent. Thus, the Examiner contends that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified a composite material of Booher by varying concentration of the heat conducting elements so that the concentration decreases from the first engaging friction or hot surface to the second non-engaging surface with the expectation of providing the desired improved thermal conductivity in addition to the excellent mechanical characteristics.

Regarding claims 21 and 23, the Examiner further admits that Booher and Miyamoto combined still fails to teach the concentration of the heat conducting

elements on the first friction surface as ranging between about 22.5 to about 42.5 weight percent as defined in claim 21 or that the decrease in concentration of the heat conducting elements is over a depth of 0.05 to 0.1 inch as defined in claim 23. The Examiner again looks to Miyamoto as teaching that the higher the concentration of the heat conducting elements, the better the thermal conductivity, referring to column 4, lines 32-39. The Examiner believes that these claims are still obvious to one of ordinary skill in the art alleging these claims are directed to optimum or workable ranges of result-effective variables that can be obtained by routine experimentation. Thus, the Examiner contends that these claims are also obvious to one of ordinary skill in the art.

The Appellant respectfully traverses these rejections for the following reasons. The Appellant respectfully submits that the Examiner has not established a prima facie case of §103(a) obviousness since she has not identified any suggestion or motivation in the prior art to modify the references or to combine their teachings, as is required and explained in MPEP 2143.01, other than that found in the instant invention. The Appellant submits that the Miyamoto et al. patent is nonanalogous art as will be explained in greater detail later herein.

Claims 1 and 11 in the instant application specifically recite that the plurality of heat conducting elements within the functionally graded friction material of the instant invention are in a selected arrangement and varying concentration. The Booher patent is directed to a high friction heat resistant material suitable for use as brake pads or even clutch material, column 2, lines 61-68, of the Booher patent. The Booher patent explains that high friction materials were known in the art that utilized various chopped fibers in a resin matrix. Booher describes a process that impregnates a plurality of strands of reinforcing fibers with thermoplastic material or resin for forming a composite material that can be cut into the desired friction units. Contrary to the claims in the subject patent application, the Booher patent, in column 2, lines 46-60, describes the use of materials to aid in the dissipation of heat, but very specifically notes that these materials are uniformly distributed through the resin

material to aid in the dissipation of heat, see, column 2, lines 54-56, of the Booher patent. Even though the Examiner admits that the Booher patent fails to teach the claimed arrangement and varying concentration of the heat conducting elements, the Examiner proposes combining a nonanalogous patent in a manner contrary to this express teaching of Booher. By doing so, the Examiner fails to acknowledge the explicit teaching of Booher of uniformly distributing through the resin material the heat conducting powder. The Booher patent teaches away from the instant invention and from the Examiner's proposed combination with the Miyamoto et al. patent.

The Miyamoto et al. patent is quite specifically directed to a heat conductive polyimide film particularly suited for use in thin film applications such as electrophotographic copying machines, laser printers, or toner image applications. The Miyamoto et al. patent does not teach or suggest a functionally graded material for use as a friction material. A skilled artisan in the friction material art would not consider the teachings of thin film applications for electrophotographic equipment when considering improvements for brake or clutch material. In column 3, lines 29-34, the thickness of the film in Miyamoto et al. is specifically recited as ranging from about 20 to 300 microns, and is preferably 20 to 50 microns with a range of 20 to 40 microns even being more preferable. The Examiner contends that Miyamoto et al. suggests other applications referring to column 7, lines 43-47. Miyamoto et al. says, "Since, conversely, said film is capable of moderately dissipating heat, the use thereof in application fields where heat accumulation may cause problems, in particular in the field of multilayer printed IC boards, is effective since it has good heat resistance and chemical resistance as well." (My emphasis added, Miyamoto et al., column 7, lines 43-47). The Examiner's misplaced emphasis on this in paragraph 6 of the Official Action, Paper No. 15, page 4, fails to note the last portion where the particular field is multilayer printed IC boards, and where heat accumulation may cause problems. There is no suggestion of any use for friction material or clutch facing material as claimed in the instant application where wear resistance is also important. As noted earlier, Booher has already

addressed heat dissipation by uniformly distributing the heat conducting powder through the resin material. One of ordinary skill in the art would not be motivated to take the teachings of a nonanalogous reference and apply them in a manner completely opposite to that of a reference in the relevant art.

The test for combining references is what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art, *In re McLaughlin, 170 USPQ 209 (CCPA 1971)*. The Appellant submits that one of ordinary skill in the art in considering a high friction heat resistant material would look to Booher and uniformly distribute the powder components to aid in the dissipation of heat as expressly taught therein. That one of ordinary skill would not look to combining the teachings of the Miyamoto et al. patent relating to thin film polyimide films in a manner contrary to that of Booher absent the teachings of the instant invention. The Appellant respectfully submits that the Examiner is using the subject application as a template to find motivation for that one to make the combination. Even though a reference is capable of being modified, there must be a suggestion or motivation (other than that gleaned from the instant application) to do so, In re Fritch, 23 USPQ2d 1780 (Fed. Cir. 1992).

The Examiner cites *In re Oeticker,* 24 USPQ2d 1443 (Fed. Cir. 1992) as support for her position that Miyamoto et al. is reasonably pertinent to the particular problem with which the Appellant was concerned. A careful review of the Oeticker decision reveals that the invention in that case was deemed patentable and not obvious. The invention in Oeticker was directed to an improved metal hose clamp having a disengagable catch. The Examiner in that case rejected the application as being obvious over an earlier Oeticker patent combined with a Lauro '400 patent describing a "hook and eye" fastener for use with garments. The Applicant in that case, like here, argued that there is no suggestion or motivation to the artisan to combine the teachings of the cited references, and that Lauro is nonanalogous art. The Court of Appeals for the Federal Circuit disagreed with the reasoning that all hooking problems are analogous. The Court in Oeticker stated: "We have reminded ourselves and the PTO that it is necessary to consider the reality of the circumstances, *In re Wood,*

599 F.2d 1032, 1036, 202 USPQ 171, 174 (CCPA 1979) -- in other words, common sense -- in deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the inventor". Further, the Court in Oeticker reiterated the well established law, "The combination of elements from nonanalogous sources, in a manner that reconstructs the applicant's invention only with the benefit of hindsight, is insufficient to present a prima facie case of obviousness. There must be some reason, suggestion, or motivation found in the prior art whereby a person of ordinary skill in the field of the invention would make the combination. That knowledge can not come from the applicant's invention itself".

Claim 2 in the subject application limits the heat conducting elements to filaments, threads, wires, powders and particulates. The Booher patent only notes the use of powder materials for heat dissipation in column 2, lines 46-60. Similarly, Miyamoto et al. in its thin film application specifically refers only to heat conductive powders and lists examples in column 2, lines 57-63. Neither reference teaches or suggests the use of filaments, threads or wires for the heat conducting elements.

The Examiner further admits that the Booher patent and the Miyamoto et al. patent fail to teach the concentration of the heat conducting elements as recited in claim 21 or the depth as recited in claim 23.

Claim 23 depends upon claim 8 and provides that heat conducting elements decrease in concentration over a depth of about 0.05 inches to about 0.10 inches. If one were to convert the range recited in the Miyamoto et al. patent as disclosed in column 3, lines 30-35, from microns first to millimeters and then to inches, the depth of 20 microns is 0.020 millimeters and 300 microns is 0.300 millimeters. To convert from millimeters to inches, one simply multiplies by 0.03937. The depth disclosed in the Miyamoto et al. patent ranges from 0.0008 inches to 0.0118 inches which is well below that of the instant invention as defined in claim 23 which recites a range of 0.05 inches to about 0.10 inches.

Further, the Miyamoto et al. patent recites that wide of range as a general range. The preferred range of Miyamoto goes only up to 50 microns which is 0.00196 inches.

The dependent claims contain the believed allowable subject matter of the independent claims from which they depend and are also allowable in their own right for the above stated reasons.

In view of the above, the Appellant respectfully submits that claims 1-8, 11, 12, 20, 21, and 23 are patentable over the cited patents.

III. REJECTION UNDER 35 U.S.C. §103(A)

The Examiner rejected claims 13-15 and 22 under 35 U.S.C. § 103(a) as being unpatentable over the Booher patent in view of the Miyamoto et al. patent as applied above, and further in view of the Nakamoto et al. patent. The Examiner admits that Booher in view of Miyamoto et al. as applied fails to teach that the metal components in a composite material, such as copper components, as recited in claim 14 are oriented perpendicular to the engaging surface of claim 15, or that the copper components or copper threads as recited in claim 13 are woven with the aramid fibers as recited in claim 22. Kindly note the Office Action, Paper No. 15, paragraph 7 in the first paragraph on page 6. The Examiner then says that the Nakamoto et al. patent teaches that a woven fabric containing a combination of synthetic yarns with a metal powder dispersed in a resin material is functionally equivalent to a woven fabric made up of metallic fibers such as copper threads and fibers for use as a high heat diffusion material, referring to column 16, lines 38-51, of that patent. The Examiner believes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to use copper threads woven with other fibers instead of copper powder in a composite material.

The Appellant respectfully traverses this rejection for the foregoing reasons as previously presented in the Argument, Section II, and the following reasons. The Nakamoto et al. patent relates to a heating garment. If one of ordinary skill in the art were to review this patent, and in particular the portion

referenced by the Examiner, one would see a catalytic combustion type heater 102 fitted firmly to a heat insulating band 113 as shown in Figure 27 of the patent. The portion the Examiner referenced describes how heat transmitted from the housing 103 to the radiating fins 111 uniformly can warm an entire area of the wearer's back.

The Appellant respectfully submits that this patent is not analogous art, as is the Miyamoto et al. patent, and that one of ordinary skill in the friction material art would not even consider the teachings of this patent. The Appellant respectfully submits that the Examiner's citation and application of this patent further supports the Appellant's position that the Examiner is simply using the claimed invention as a template to pick and choose among isolated disclosures in the prior art. It is well settled law that one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention, *In re Fine,* 5 USPQ 2d 1596 (Fed. Cir. 1988). As noted previously, there is no mention of clutch material or even a friction material in the Miyamoto et al. patent, and neither is there any reference of these materials in the Nakamoto et al. garment patent. There is no suggestion or motivation to make the Examiner's proposed combination other than the instant invention.

Neither the Booher patent or the Miyamoto et al. patent teaches or suggest the use of filaments, threads, or wires for heat conducting elements. Both of those cited patents use heat dissipating powder (Booher, column 2, lines 46-60) or heat conductive powder (Miyamoto et al., column 2, lines 57-63). Claim 13 of the instant invention requires filaments, threads or wires. Claim 22 further limits the invention to copper threads interwoven with aramid fibers. Claim 14 which depends on claim 13 further limits the metal components to copper and copper alloy components.

In view of the above, the Appellant respectfully submits that claims 13-15 and 22 are patentable over the cited patents.

CONCLUSION

For the foregoing reasons, the Appellant respectfully submits that the Examiner's rejection of the claims was erroneous. These claims stand patentable over the cited patents. Therefore, your Honors are requested to favorably consider this Appeal and to allow the claims of this application.

Respectfully submitted,

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APPENDIX A

1. A clutch facing material with improved wear resistance and thermal conductivity, comprising:

a functionally graded material including a composite material having heat and wear resistant fibers therein impregnated with a resin; and

a plurality of heat conducting elements situated within said functionally graded material in a selected orientation and spatial distribution with a varying concentration, wherein said functionally graded material is constructed for engagement with a cooperating movable member, said functionally graded material including a first friction surface constructed for such engagement and a second non-engaging surface, said varying concentration of said heat conducting elements decreasing in concentration from said first friction surface to said second non-engaging surface, said heat conducting elements transferring heat away from the first friction surface of said functionally graded material to the second non-engaging surface.

2. A clutch facing material as set forth in claim 1, wherein said plurality of heat conducting elements comprise members selected from the group consisting of filaments, threads, wires, powders, and particulate, said heat conducting elements being disposed in said functionally graded material in a predetermined arrangement.

3. A clutch facing material as set forth in claim 1, wherein said plurality of heat conducting elements are positioned substantially normal to said first friction surface of said functionally graded material.

4. A clutch facing material as set forth in claim 1, wherein said heat and wear resistant fibers comprise aramid fibers.

5. A friction material as set forth in claim 4, wherein said aramid fibers

comprise p-aramid fibers.

6. A clutch facing material as set forth in claim 2, wherein said plurality of heat conducting elements comprise members selected from the group consisting of metal, metal alloy, copper, copper alloy, and graphite compositions.

7. A clutch facing material as set forth in claim 1, wherein said fibers comprise members selected from the group consisting of minerals, glass, asbestos, cotton, polyester, graphite, carbon, pyrolytic carbon, aramid, synthetic, and polymer fibers.

8. A clutch facing material as set forth in claim 1, wherein said heat conducting elements comprise a greater density on said first friction surface than said second non-engaging surface.

11. In a composite clutch facing material having opposed surfaces with one surface engaging a movable, engageable part, the improvement comprising heat conducting elements disposed in said composite clutch facing material in a selected arrangement and a varying concentration for transferring heat away from said engaging surface to a non-engaging surface, said varying concentration of said heat conducting elements decreasing in concentration from said first surface to said second non-engaging surface.

12. The clutch facing material according to claim 11, wherein said heat conducting elements comprise a plurality of metal components disposed within said friction material.

13. The clutch facing material according to claim 12, wherein said plurality of metal components comprise members selected from the group consisting of filaments, threads, and wires.

14. The clutch facing material according to claim 13, wherein said plurality of metal components comprise members selected from the group consisting of copper components and copper alloy components.

15. The clutch facing material according to claim 12, wherein said metal components are oriented substantially perpendicular to said engaging surface.

20. The clutch facing material according to claim 11, wherein said heat conducting elements comprise a greater density on said engaging surface than on said non-engaging surface.

21. A clutch facing material as set forth in claim 8, wherein the density of said heat conducting elements on said first friction surface ranges between about 22.5% to about 42.5% on a weight percent basis.

22. A clutch facing material as set forth in claim 4, wherein said heat conducting elements comprise copper threads, said copper threads being woven with said aramid fibers.

23. A clutch facing material as set forth in claim 8, wherein the varying concentration of said plurality of heat conducting elements comprises a decrease in concentration of said plurality of heat conducting elements over a depth of about 0.05 inches to about 0.10 inches.